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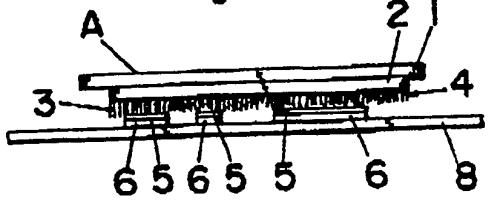
(54) Layered structure for the transfer of a patterned layer of fibres by the application of pressure.

(57) A pressure sensitive transferable flocked fibers patch comprises a support sheet formed with an adhesive layer thereon, a flocked fiber layer having short fibers flocked at the lower ends in the adhesive layer. A patterning layer extends in a desired pattern over the flocked fiber layer to have the upper ends of the fibers anchored in the patterning layer. Superimposed on the patterning layer is a transfer layer which comprises a pressures sensitive adhesive having a higher adhesive strength than the adhesive layer. The transfer layer is in use adapted to be adhered on an object article surface together with the patterning layer such that when the support layer is peeled off relative to the patterning layer the fibers anchored in the patterning layer are kept held to the object surface as being detached from the adhesive layer while the reminding fibers are removed together with the adhesive layer on the support sheet. Thus, the flocked fibers are successfully transferred on the object surface to present a predetermined pattern of the fibers thereon.

Fig.3



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TECHNICAL FIELD

The present invention relates to a pressure sensitive transferable flocked fiber patch, and more particularly to such transferable flocked fibers patch having a pattern of flocked fibers which can be readily transferred onto an object article simply through an application of a pressure and without an application of heat.

BACKGROUND ART

As disclosed in Japanese Patent Publication <KOKOKU> No. 56-45388, a prior art transferable flocked fibers patch comprises a support sheet with an adhesive layer, short fibers flocked in the adhesive layer, a heat sensitive adhesive layer stacked over the flocked fibers in a desired pattern, and a release sheet stuck to the heat sensitive adhesive layer. To transfer the desired pattern of the flocked fibers onto an object article surface, the release sheet is peeled off to place the patch on the object article with its heat sensitive adhesive layer in contact with the article surface. Then, the patch is subjected to heating and pressing applied from the rear of the support sheet for a suitable time period by means of a hot iron or press to melt the heat sensitive adhesive. After cooling at a normal temperature, the heat sensitive adhesive layer is hardened to complete the adhesion between the patterned portion of the flocked fibers onto the article surface. Thereafter, the support sheet is removed from the flocked pattern of the fibers, leaving the flocked pattern of the fibers kept adhered or transferred on the article surface. However, problems are encountered with the prior transferable flocked fibers patch due to the use of the heat sensitive adhesives requiring the heating and pressing. One of the problem is that, when transferring the patch onto a curved, concave or convex, or the like complicated surface of the object article, it is very difficult to apply a suitable pressing force and the heat simultaneously to such complicated surface uniformly by the use of the hot iron or press. The other problem is seen when the pattern of flocked fibers is to be transferred onto the object article made of synthetic resin or a textile of synthetic fibers having poor heat-resisting properties. In this case, the object article surface is likely to be melt or deformed by the application of heat, which eventually leads to the deformation of the flocked pattern itself. Therefore, the prior flocked fibers transferable patch sees a considerable limitation to a surface configuration or a material of the object article. Further, the heating required in the transfer of the flocked fibers is itself cumbersome and even dangerous in that it may cause burns, especially when children take the transfer operation with the hot iron.

The above problems have been eliminated in the present invention which has therefore a primary object to provide a pressure sensitive transferable flocked fibers patch which can be readily applied to an object article surface substantially irrespective of the material as well as the surface configuration thereof and can have its flocked fibers pattern transferred in a safety manner.

The pressure sensitive transferable flocked fibers patch in accordance with the present invention comprises a support sheet with an adhesive layer having a relatively low adhesive strength, a flocked fibers layer with short fibers flocked in the adhesive layer, a patterning layer formed partially over the flocked fibers layer in a desired pattern with the fibers anchored firmly in the patterning layer, and a transfer layer of pressure sensitive adhesive formed on the patterning layer and having a higher adhesive strength than that of the adhesive layer. With this arrangement, the fibers can be readily transferred on an object article surface in a predetermined pattern of the patterning layer simply by the steps of placing the transfer layer of pressure sensitive adhesive upon the article surface, pressing the support sheet against the surface particularly at the patterning layer, and peeling off the support sheet. Thereby, the fibers anchored in the patterning layer can remain adhered to the article surface while the other fibers can be removed together with the support sheet, leaving the fibers on the article surface in a predetermined pattern defined by the patterning layer to complete the transfer of the flocked fibers onto the article surface. Thus, it is possible to transfer the flocked fibers on the article surface without applying heat and even onto a complicated surface of the object article in an ease manner and in a safe manner free from burns which would otherwise occur when the heating is essential.

Preferably, the patterning layer comprises a polymer resin layer which is screen printed on the flocked layer and is cured such that the ends of the fibers opposite to the ends held in the adhesive layer on the support sheet can be entrapped in the resin layer to be firmly anchored therein. Thus, the fibers anchored in the patterning resin layer can remain adhered selectively on the article surface after the support sheet is removed.

It is therefore another object of the present invention to provide a pressure sensitive transferable flocked fibers patch in which the patterning layer can be readily deposited on the flocked fibers by screen printing technique in any desired pattern.

The pressure sensitive transferable flocked fibers patch of the present invention may comprise a support sheet with an adhesive layer having a low

adhesive strength, a flocked fibers layer having short fibers flocked in the adhesive layer, and a release sheet with a transfer layer of patterned pressure sensitive adhesive having a greater adhesive strength than the adhesive layer on the support sheet. The pressure sensitive adhesive are formed in a desired pattern on the release sheet to extend partially over the flocked layer so that the fibers flocked in the adhesive layer can be firmly held at that patterned transfer layer. Also with this arrangement, it is readily possible to transfer the fibers onto an object article surface simply by peeling off the release sheet to expose the transfer layer, placing the patterned transfer layer on the article surface, pressing the flocked fibers against the surface by applying a pressing force over the rear side of the support sheet, and then removing the support sheet. Thus, only the flocked fibers held adhered on the patterned transfer layer of the pressure sensitive adhesive can be transferred to present a predetermined pattern of the fibers on the article surface.

It is therefore a further object of the present invention to provide a pressure sensitive transferable flocked fibers patch in which flocked fibers are firmly held directly to the patterned transfer layer of pressure sensitive adhesive and can be transferred on the article surface together with the patterned pressure sensitive adhesive.

These and still other objects and advantages of the present invention will become more apparent from the following description of the embodiments when taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view illustrating a support sheet and a flocked fibers layer formed thereon through an adhesive layer constituting a pressure sensitive transferrable flocked fibers patch in accordance with a preferred embodiment of the present invention;

FIG. 2 is a view illustrating the flocked fibers patch with a release sheet attached thereon;

FIGS. 3 and 4 are views illustrating the transfer operations of the flocked fibers onto an object article surface;

FIGS. 5 and 6 are partial views illustrating members constituting a pressure sensitive transferable flocked fibers patch in accordance with another embodiment of the present invention;

FIG. 7 is a sectional view Of the transferable flocked fibers patch; and

FIGS. 8 and 9 are views illustrating the transfer operations of the flocked fibers onto an object article surface.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Referring to FIGS. 1 and 2, a pressure sensitive transferable flocked fibers patch **A** in accordance with a first embodiment of the present invention comprises a support sheet **1** coated with an adhesive layer **2**, and a flocked fibers layer **4** comprising a number of substantially evenly distributed short fibers **3** flocked at their lower ends in the adhesive layer **2**. A patterning layer **5** is formed to selectively extend over the flocked layer **4** in a predetermined pattern to have the upper ends of the flocked fibers **3** anchored in the patterning layer **5**. Deposited on the patterning layer **5** is a pressure sensitive transfer adhesive layer **6** which has a higher adhesive strength than the adhesive layer **2**. A release sheet **7** extends over the transfer layer **5** and the flocked layer **4** remaining exposed between the patterning layer **5**.

The support sheet **1** is, for example, made of a paper or a transparent or opaque synthetic resin sheet. The adhesive layer **2** is formed by coating a solvent type adhesive such as acrylate silicone resin on the support sheet **1**. Such adhesive contains toluene as a solvent which has an affinity to the synthetic resin sheet so that it can be readily coated on the support sheet **1** when the synthetic resin support sheet **1** is used. The short fibers **3**, which may be natural or artificial ones, are flocked upright into the adhesive layer **2** by the conventional electrostatic flocking technique, to have the respective lower ends held in the adhesive layer **2**, as shown in FIG. 1. The fibers **3** may be dyed to present a desired color or colors as necessary. The electrostatic flocking is carried out after the solvent in the adhesive is completely vaporized so that no harmful induced explosion of the solvent occurs in the flocking operation.

The patterning layer **5** is deposited on the selected areas of the flocked fibers layer **4** by a screen printing in such a manner that the upper ends of the fibers **3** project into the patterning layer **5**. The patterning layer **5** is formed from an urethane resin with an epoxy resin as a cross-linking agent, although it may be formed from acrylic resin, synthetic rubber resin, vinyl chloride resin, vinyl acetate resin, or the like polymer resin. When the resin is cured through the cross-linking reaction, the upper ends of the short fibers **3** can be anchored in the cured patterning layer **5** while the lower ends are loosely held in the adhesive layer **2**.

Also the transfer adhesive layer **6** is deposited on the patterning layer **5** by the like screen printing. The transfer layer **6** exhibits a higher adhesive strength than the adhesive layer **2** and is suitably selected from those widely utilized in the art as a pressure sensitive adhesive. Adhesive components and its proportions may be suitably varied depending on the material of the object article **8** to which

the fibers 3 are transferred. The release sheet 7 may be a paper or a synthetic resin which is readily peelable from the transfer layer 6. The release sheet 7 covers the transfer layer 6 for protection thereof prior to the application of the patch A.

Referring now to FIGS. 3 and 4, an explanation is made to a manner of transferring the fibers 3 of the patch A to the object article 8. Firstly, the release sheet 7 is peeled off to expose the transfer layer 6. Then, the patch A is placed on the surface of the article, such as a cover of a book, a pencil case and the like, with the transfer layer 6 in contact with the article surface, as shown in FIG. 3. Thereafter, a pressing force is applied against the article surface such as by rubbing the rear side of the support sheet 1 forcibly by a finger or palm of the user, whereby the transfer layer 6 can be adhered to the article surface with the fibers 3 held attached on the transfer layer 6 through the patterning layer 5 as being pulled out from the adhesive layer 2 of less adhesive strength. Therefore, after peeling off of the support sheet 1, the fibers 3 anchored in the patterning layer 5 can be transferred onto the article surface while the remaining fibers 3 not anchored to the patterning layer 5 are removed together with the support sheet 1, leaving the fibers 3 in a predetermined pattern on the surface of the article 8.

FIGS. 5 to 7 illustrate a pressure sensitive transferrable flocked fibers patch in accordance with a second embodiment of the present invention. The patch A' comprises a like peelable support sheet 1a coated with a like adhesive layer 2a of relatively low adhesive strength, a flocked fiber layer 4a having short fibers 3a flocked in the adhesive layer 2a, and a pressure sensitive transfer adhesive layer 6a. A release sheet 7a made of a paper or plastic sheet covers the transfer layer 6a and is readily peelable therefrom. The transfer layer 6a comprises a pressure sensitive adhesive which exhibits a higher adhesive strength than the adhesive layer 2a and is deposited on the release sheet 7a in a desired pattern on the release sheet 7a by the screen printing technique, as shown in FIG. 6. Thus formed transfer layer 6a is then placed on the flocked fiber layer 4a with the release sheet 7 outwardly so as to catch the upper ends of the fibers 3a into the transfer layer 6a, thereby providing the patch A' of FIG. 7. In this condition, the fibers 3a have its upper end firmly anchored in the transfer layer 6a while the lower ends of the fibers 3a are relatively loosely caught in the adhesive layer 2a.

Likewise in the first embodiment, the support sheet 1a is made of a paper or a transparent or opaque synthetic resin. The adhesive layer 2a is made of a hot-melt pressure sensitive adhesive layer 2a deposited on the support sheet 1a. The short fibers 3, which may be natural or artificial ones, are flocked upright by the electrostatic flocking technique. The transfer layer 6a is formed from another hot-melt pressure sensitive adhesive deposited on the release 7a and having a higher adhesive strength than that of the adhesive layer 2a.

When using the hot-melt pressure sensitive adhesive as the transfer layer 6a requiring a strong adhesive strength, it is normally expected to have an increased thickness than that of the adhesive layer. In view of the above and further in that the hot-melt pressure sensitive adhesive is generally more viscous at room temperature than at an elevated temperature, the screen printing can be practically possible only when the hot-melt pressure sensitive adhesive is of less viscosity as being heated to an elevated temperature. However, if screen printing the hot-melt adhesive at the elevated temperature directly on the flocked fibers, the adhesive of less viscosity would fall and droop along the fibers so as to decolor or degrade the substantial portion of the fibers which makes it practically impossible to deposit a relatively thick adhesive transfer layer directly on the flocked fibers. Further, if the screen printing is possible with the hot-melt adhesive in the high viscosity condition or at the room temperature, the high viscosity adhesive is very likely to stick the fibers to the screen itself, thereby increasing a possibility of removing the fibers from the support layer when the screen is moved away from the flocked fibers. These problems have been avoided in this embodiment in which the transfer layer 6a is screen printed on the release sheet 7a and is then superimposed on the flocked fibers layer 4a. That is, the relatively thick hot-melt pressure sensitive adhesive can be deposited in a predetermined pattern on the release sheet 7a by the screen printing with the adhesive kept in an elevated temperature or in less viscosity condition. The adhesive or the patterned transfer layer 6a can be therefore successively placed on the flocked fiber layer 4a after being cooled to be in more viscous condition, to seize the upper ends of the fibers 3a in the transfer layer 6a. Further, since the transfer layer 6a is formed on the release sheet 7a rather than directly on the flocked fiber layer 4a, a more delicate pattern can be obtained with increased stability.

The patch A' of the second embodiment can be applied onto the surface of an article object 8 readily in the like manner as in the first embodiment. FIGS. 8 and 9 show the procedures of transferring the fibers onto the surface of the object article 8. After the release sheet 7a is peeled off to expose the transfer layer 6a, the patch A' is placed upon the object article surface 8 to bring the ex-

posed transfer layer **6a** in contact with the surface **8**, as shown in FIG. 8. Then, a pressing force is applied against the article surface such as by rubbing the rear side of the support sheet **1a** forcibly by a finger or palm of the user, whereby the transfer layer **6a** can be adhered to the article surface with the fibers **3a** held attached thereon as being pulled out from the adhesive layer **2a** of less adhesive strength. Therefore, after peeling off of the support sheet **1a**, the fibers **3a** anchored in the transfer layer **6a** can be transferred onto the article surface while the remaining fibers **3** not anchored to the transfer layer **6a** are removed together with the support sheet **1a**, leaving the fibers **3a** in a predetermined pattern on the surface of the article **8**, as shown in FIG. 9.

It is noted at this point that the adhesive layer **2a** of the second embodiment is formed from the hot-melt adhesive layer which is free from any solvent which may induce an explosion when subjected to the electrostatic flocking. Therefore, the electrostatic flocking can be carried out immediately after the formation of the hot-melt adhesive layer **2a** on the support sheet **1a** without the risk of the induced explosion.

The hot-melt pressure sensitive adhesive utilized in the present embodiment may comprise high viscosity resin such as acrylic resin, polyurethane, styrene-butadiene block-polymer (SBS) and styrene-isopuren block-polymer (SIS), inclusive of a liquid synthetic rubber as a viscosity decreasing agent such as isobutylene rubber, ploybutadiene rubber and the like having a low molecular weight and a suitable fluidity at a normal temperature and/or a viscosity increasing agent such as rosin, rosin ester, hydrogenation rosin ester, xylene-formaldehyde resin, xylene-alkylphenol formalin resin, alkylphenol formalin resin, petroleum resin, terpene resin, terpene-phenol resin, cumarone indene resin and the like. The adhesion strength of the pressure sensitive adhesive can be adjusted widely by controlling the added amount of the viscosity increasing agent. That is, to increase an adhesion strength, it is contemplated to incorporate in an increased amount such a resin that has a high solubility parameter like rosin, alkylphenol resin, xylene phenol formalin resin and terpene phenol resin may be added much under a control. To decrease the adhesion strength, on the other hand, it is contemplated to incorporate in an increased proportion such a resin that has a low solubility parameter. It is noted at this point that the hot-melt pressure sensitive adhesive utilized to form the adhesive layer **2a** as well as the transfer layer **6a** includes no emulsifier so that the patch **A'** of the present embodiment has no limitation as to the material of the object article and therefore the fiber can be therefore transferred successfully onto a rubber, a synthetic resin, a textile, a natural leather, a synthetic leather, a wood, a steel, a stone and the others.

When the support sheet **1**, **1a** is made of transparent or semitransparent material, the patterning layer **5** or the patterned transfer layer **6a** can be seen through the support sheet **1**, **1a** so that the patch can be conveniently positioned on the object article surface prior to the transferring of the fibers. When the support sheet **1**, **1a** is made of opaque material, it is preferred to additionally print a pattern or markings on the rear of the support sheet **1**, **1a** in correspondence to the patterning layer **5** or the transfer layer **6a** for easy confirmation in positioning the patch on the object article prior to the transfer procedure.

The features disclosed in the foregoing description, in the claims and/or in the accompanying drawings may, both separately and in any combination thereof, be material for realising the invention in diverse forms thereof. LIST OF REFERENCE NUMRERALS

1	support sheet
2	adhesive layer
3	fibers
4	flocked layer
5	patterning layer
6	transfer layer
7	release sheet
8	object article

1a	support sheet
2a	adhesive layer
3a	fibers
4a	flocked layer
6a	transfer layer
7a	release sheet
8	object article

Claims

1. A pressure sensitive transferable flocked fibers patch comprising:
a support sheet formed with an adhesive layer thereon;
a flocked fiber layer having short fibers flocked at the lower ends in said adhesive layer;
a patterning layer extending in a desired pattern over said flocked fiber layer to have the upper ends of said fibers anchored in said patterning layer; and
a transfer layer superimposed on said patterning layer, said transfer layer comprising a pressures sensitive adhesive which has a higher adhesive strength than said adhesive layer, said transfer layer being adapted to be adhered on an object article surface together with

said patterning layer such that when the support layer is peeled off relative to said patterning layer the fibers anchored in said patterning layer are kept held to the object surface as being detached from said adhesive layer while the reminding fibers are removed together with said adhesive layer on said support sheet.

2. A pressure sensitive transferable flocked fiber patch as set forth in claim 1, wherein said patterning layer comprises a polymer resin screen printed a desired pattern on said flocked fiber layer.

3. A pressure sensitive transferable flocked fiber patch comprising:
a support sheet formed with an adhesive layer thereon;
a flocked fiber layer having short fibers flocked at the lower ends in said adhesive layer;
a transfer layer of pressure sensitive adhesive having a higher adhesive strength than said adhesive layer, said transfer layer extending in a desired pattern over said flocked fiber layer to have the upper ends of said fibers anchored in said transfer layer; and
a release sheet superimposed on said transfer layer to be peelable therefrom;
said transfer layer being adapted to be adhered on an object article surface such that when the support layer is peeled off relative to said transfer layer the fibers anchored in said transfer layer are kept held to the object surface as being detached from said adhesive layer while the reminding fibers are removed together with said adhesive layer on said support sheet.

4. A pressure sensitive transferable flocked fiber patch as set forth in claim 3, wherein said adhesive layer and said transfer layer are each formed from a hot-melt pressure sensitive adhesive.

5. A pressure sensitive transferable flocked fiber patch as set forth in claim 3 or 4, wherein said transfer layer is screen printed in a desired pattern on said release sheet and is superimposed on said flocked layer.

6. A pressure sensitive transferable flocked fiber patch as set forth in claim 1 or 3, wherein said support sheet is made of transparent or semi-transparent material.

7. A pressure sensitive transferable flocked fiber patch as set forth in claim 1 or 3, wherein said support sheet is made of opaque material and is printed on its surface opposite to said adhesive layer with a pattern in correspondence to the transfer layer.

Fig.1

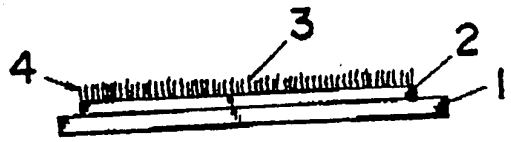

Fig.2

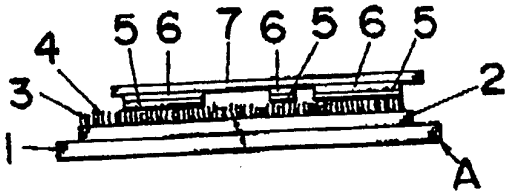

Fig.3

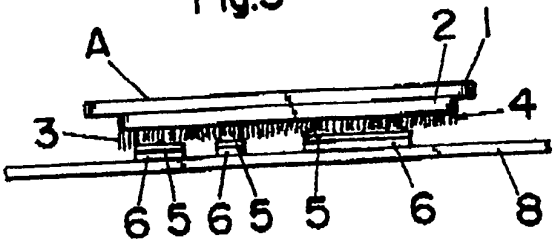

Fig.4

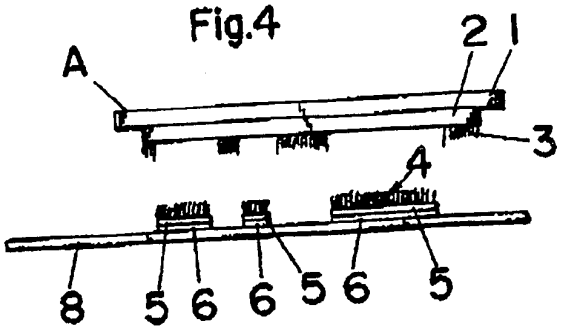

Fig.5

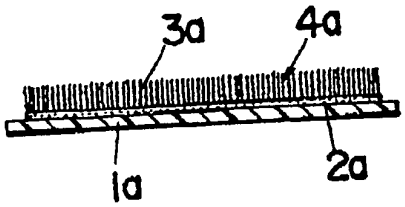

Fig.6

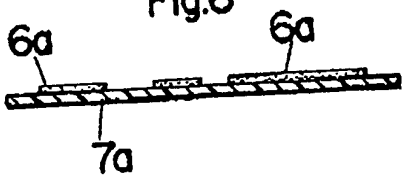

Fig.7

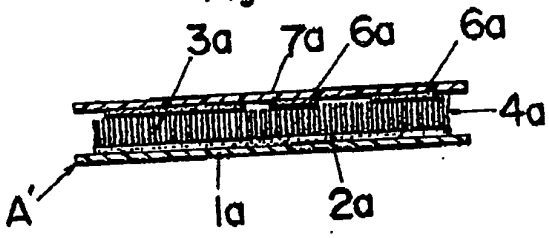

Fig.8

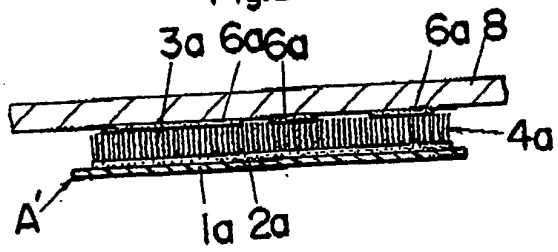

Fig.9

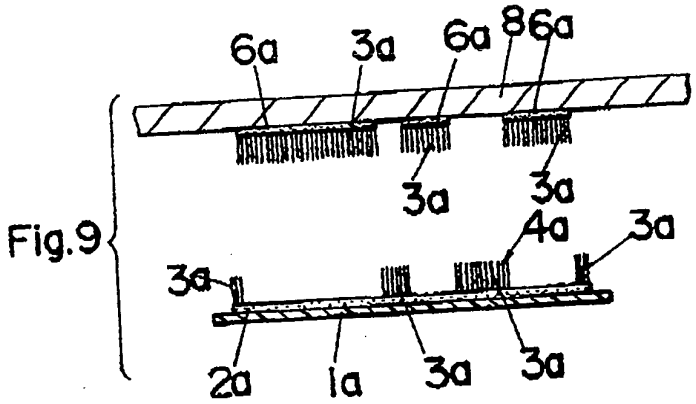

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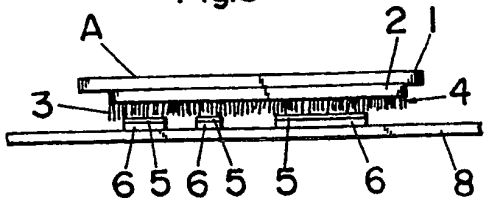
Fig.3



EP 0 448 955 A3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 10 2454

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-4 292 100 (S. HIGASHIGUCHI) * Column 4, lines 3-40; column 5, line 1 - column 8, line 20; claim 1 * ---	1-6	B 44 C 1/17 D 06 Q 1/14
X	WO-A-8 901 829 (HIGH VOLTAGE GRAPHICS INC.) * Page 2, lines 7-17 * ---	1	
A	EP-A-0 210 304 (S. KOMATSU et al.) * Page 3, line 20 - page 5, line 13; claims 1,2,4,5,10 * ---	1,2,4,5	
A	US-A-4 142 929 (K. OTOMINE et al.) * Column 1, line 27 - column 4, line 21; claim 1 * -----	1,2,4-6	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 44 C
D 06 Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	04-07-1991	DOOLAN G.J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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O : non-written disclosure
P : intermediate document

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E : earlier patent document, but published on, or after the filing date
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L : document cited for other reasons

& : member of the same patent family, corresponding document

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